UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/739,353	12/19/2003	Mikio Ito	032188	1077

38834	7590	01/13/2006

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER
SONG, JASMINE

ART UNIT	PAPER NUMBER
2188	

DATE MAILED: 01/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

<table>
<tr><td rowspan="2">Office Action Summary</td><td>Application No.
10/739,353</td><td>Applicant(s)
ITO ET AL.</td></tr>
<tr><td>Examiner
Jasmine Song</td><td>Art Unit
2188</td></tr>
</table>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-13 and 15-20* is/are rejected.

7)☒ Claim(s) *4 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date *12/19/03*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Detailed Action

Specification

1.   The lengthy specification has not been checked to the extent necessary to

determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the

specification.

Drawings

2.   The drawings are objected to because "cash control" should be changed to –

cache control -- in Fig.13.

        "Acquire Cash Memory" should be changed to -- Acquire Cache Memory – in

Fig.15.

        Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

Oath/Declaration

3.   The applicant's oath/declaration has been reviewed by the examiner and is found

to conform to the requirements prescribed in 37 C.F.R. 1.63.

Information Disclosure Statement

4.   The information disclosure statement (IDS) submitted on 12/19/03 is in

compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure

statement is being considered by the examiner.

Priority

5.   Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which

papers have been placed of record in the file.

Claim Objections

6.   Claims 1,5,11,15 objected to because of the following informalities:

In claims 1 and 11, "RLU" should be changed to – RAID logic unit--.

In claims 5 and 15, "RLBA" should be changed to – RAID Logic Block Address –.

In claims 5 and 15, "LBA" should be changed to – Logic Block Address--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

8.   Claims 8,18 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Claim 8 and 18 recites the limitation "the conversion area" in lines 3. There is

insufficient antecedent basis for this limitation in the claim. Claims 9 and 19 are rejected

since they are depended on the rejected claims 8 and 18.

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

10.   Claims 1-3,5-8,10-13,15-18 and 20 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Honda et al., US 2002/0178328 A1, in view of Smith., US 6347359

B1.

Regarding claims 1 and 11, Honda teaches that a RAID apparatus for separating

data according to a RAID configuration definition and reading/writing the data from/to a

plurality of physical disk devices in parallel, comprising:

a control unit (it is taught as main controller 10) for accessing said plurality of

physical disk devices (it is taught as storage devices 1-1,1-2...1-N as shown in Fig.20)

according to RLU mapping (it is taught as RAID configuration) based on said RAID

configuration definition (it is taught as cooperation control information, Fig.22) upon an

I/O request from a host device (it is taught as read or write access requests, Fig.27-28

and Fig.30-31, the storage device processes the access request based on the access

request information and the cooperation control information);

a table (Fig.22) for storing old RAID configuration definition information which

defines at least an old RAID level and a number of old logical devices (Fig.22, it is

taught as storage device #1having RAID level information, Number of data disks,

Number of redundant data disk), and any other storage devices which has the same

information as set up for storage device #1, section 0213; and

a cache memory (it is taught as a buffer 12) for temporarily storing data for

changing the old RAID configuration to the new RAID configuration (section 0205, lines

4-6 and section 0274), wherein said control unit reads out the data from said plurality of

physical disk devices to said cache memory according to the RLU mapping based on

said old RAID configuration definition of said table (Fig.32, section 0274), and writes the data which was read out to said cache memory (Fig.33, step 201) to said plurality of physical disk devices (section 0290) based on the cooperation control information.

Honda does not teach that a new RAID configuration definition information which defines at least a new RAID level and a number of new logical devices and writes the data according to the RLU mapping based on said new RAID configuration.

However, Smith teaches that a new RAID configuration definition information which defines at least a new RAID level and a number of new logical devices (it is taught as the destination configuration may include a new RAID level and number of disks as compare to the source configuration, col.5, lines 1-6) and writes the data according to the RLU mapping based on said new RAID configuration (it is taught as a data migration routine to perform the data migration required to reconfigure the source configuration to the destination configuration, col.5, lines 44-46).

It would have been obvious to the ordinary skill in the art at the time the invention was made to utilize the teachings of Smith into Honda's storage system such as a new RAID configuration definition information defines at least a new RAID level and a number of new logical devices and writes the data according to the RLU mapping based on said new RAID configuration because it will dramatically increases the speed of reconfiguration for the source and destination configurations by maintaining the RAID level and the number of disk parameters in the RAID system (col.3, lines 41-43 and col.4, lines 55-57).

According, one of ordinary skill in the art would have recognized this and concluded that they are from the same field of endeavor. This would have motivated one of ordinary skill in the art to implement the above combination for the advantages set forth above.

Regarding claims 2 and 12, Honda and Smith teach said control unit performs RAID level conversion processing (Fig.3 of Smith teach all types of RAID level conversion) by reading out the data from said plurality of physical disk devices to said cache memory according to the RLU mapping based on the RAID level of said old RAID configuration definition, and writing the data which was read out to said cache memory to said plurality of physical disk devices according to the RLU mapping based on the RAID level of said new RAID configuration definition (see rejection of claims 1 and 11).

Regarding claims 3 and 13, Honda and Smith teach said control unit performs capacity increase processing (Smith teaches RAID system is physically or logically reconfigured by adding disks, col.4, lines 59-61) by reading out the data from said plurality of physical disk devices to said cache memory according to the RLU mapping based on said number of logical devices in said old RAID configuration definition, and writing-the data which was read .out to said cache memory to said plurality of physical disk devices according to the RLU mapping based on said number of logical devices in said new RAID configuration definition (see rejection of claims 1 and 11).

Regarding claims 5 and 15, Honda and Smith teach said control unit converts

RLBA based on the new RAID configuration definition to the host LBA (Honda teaches

the position map information indicating a relative position in the loop interface and

Fig.25, section 0217), then reads out the data from said plurality of physical disk

devices to said cache memory according-to the RLU mapping based on said old RAID

configuration definition using said host LBA, and writes the data which was read out to

said cache memory to said plurality of physical disk devices according to the RLU

mapping based on said new RAID configuration definition using said RLBA (see

rejection of claims 1 and 11).

Regarding claims 6 and 16, Honda and Smith teach said control unit converts

said old RAID configuration into said new RAID configuration, and then deletes said old

RAID configuration definition from said table (deleting the old RAID configuration

definition is taught as the source configuration has been changed to the destination

configuration by changing RAID level, number of disks, strip size and stripe size).

Regarding claims 7 and 17, Honda and Smith teach said control unit creates said

new RAID configuration definition in said table according to the instructed parameters of

the new RAID configuration definition and said old RAID configuration definition (Fig.22

such as RAID level, number of data disk s and redundant data disks).

Regarding claims 8 and 18, Honda and Smith teach said control unit acquires an area of said cache memory corresponding to the conversion area (it is taught as the transmission/reception data storage unit 27 of the buffer 12), and then executes conversion from said old RAID configuration into said new RAID configuration sequentially.

Regarding claims 10 and 20, Honda and Smith teach said control unit performs said RLU mapping according to a strip depth and stripe size corresponding to the stripe of said RAID configuration (see col.5, lines 1-6).

Allowable Subject Matter

11.   Claims 4,9,14 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12.   When responding to the office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections. See 37 C.F.R. 1.111 (c).

13.   When responding to the office action, Applicants are advised to provide the

examiner with the line numbers and page numbers in the application and/or references

cited to assist examiner to locate the appropriate paragraphs.

14.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jasmine Song whose telephone number is 571-272-

4213. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mano Padmanabhan can be reached on 571-272-4210. The fax phone

numbers for the organization where this application or proceeding is assigned are 571-

273-8300.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 703-305-

3900.

Jasmine Song   Mano Padmanabhan   7/6/06

Patent Examiner   Supervisory Patent Examiner

January 5, 2006   Technology Center 2100

MANO PADMANABHAN
SUPERVISORY PATENT EXAMINE